

C2. Alphabetical Listing of Explicit Interfaces

The file supplied as `nr.f90` contains explicit interfaces for all the Numerical Recipes routines (except those already in the module `nrutil`). The interfaces are in alphabetical order, by the generic interface name, if one exists, or by the specific routine name if there is no generic name.

The file `nr.f90` is normally invoked via a USE statement within a main program or subroutine that references a Numerical Recipes routine. See §21.1 for an example.

```
MODULE nr
INTERFACE
    SUBROUTINE airy(x,ai,bi,aip,bip)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: ai,bi,aip,bip
    END SUBROUTINE airy
END INTERFACE
INTERFACE
    SUBROUTINE ameba(p,y,pb,yb,ftol,func,iter,temptr)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: iter
    REAL(SP), INTENT(INOUT) :: yb
    REAL(SP), INTENT(IN) :: ftol,temptr
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: y,pb
    REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: p
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE ameba
END INTERFACE
INTERFACE
    SUBROUTINE amoeba(p,y,ftol,func,iter)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: iter
    REAL(SP), INTENT(IN) :: ftol
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: p
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
END INTERFACE
```

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```

    END SUBROUTINE amoeba
  END INTERFACE
INTERFACE
  SUBROUTINE anneal(x,y,iorder)
  USE nrtype
  INTEGER(I4B), DIMENSION(:), INTENT(INOUT) :: iorder
  REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
  END SUBROUTINE anneal
END INTERFACE
INTERFACE
  SUBROUTINE asolve(b,x,itrnsp)
  USE nrtype
  REAL(DP), DIMENSION(:), INTENT(IN) :: b
  REAL(DP), DIMENSION(:), INTENT(OUT) :: x
  INTEGER(I4B), INTENT(IN) :: itrnsp
  END SUBROUTINE asolve
END INTERFACE
INTERFACE
  SUBROUTINE atimes(x,r,itrnsp)
  USE nrtype
  REAL(DP), DIMENSION(:), INTENT(IN) :: x
  REAL(DP), DIMENSION(:), INTENT(OUT) :: r
  INTEGER(I4B), INTENT(IN) :: itrnsp
  END SUBROUTINE atimes
END INTERFACE
INTERFACE
  SUBROUTINE avevar(data,ave,var)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: data
  REAL(SP), INTENT(OUT) :: ave,var
  END SUBROUTINE avevar
END INTERFACE
INTERFACE
  SUBROUTINE balanc(a)
  USE nrtype
  REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
  END SUBROUTINE balanc
END INTERFACE
INTERFACE
  SUBROUTINE banbks(a,m1,m2,al,indx,b)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: m1,m2
  INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: a,al
  REAL(SP), DIMENSION(:, :), INTENT(INOUT) :: b
  END SUBROUTINE banbks
END INTERFACE
INTERFACE
  SUBROUTINE bandec(a,m1,m2,al,indx,d)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: m1,m2
  INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: indx
  REAL(SP), INTENT(OUT) :: d
  REAL(SP), DIMENSION(:, :), INTENT(INOUT) :: a
  REAL(SP), DIMENSION(:, :), INTENT(OUT) :: al
  END SUBROUTINE bandec
END INTERFACE
INTERFACE
  SUBROUTINE banmul(a,m1,m2,x,b)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: m1,m2
  REAL(SP), DIMENSION(:), INTENT(IN) :: x
  REAL(SP), DIMENSION(:), INTENT(OUT) :: b
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: a

```

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```

    END SUBROUTINE banmul
  END INTERFACE
INTERFACE
    SUBROUTINE bcucof(y,y1,y2,y12,d1,d2,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: d1,d2
    REAL(SP), DIMENSION(4), INTENT(IN) :: y,y1,y2,y12
    REAL(SP), DIMENSION(4,4), INTENT(OUT) :: c
    END SUBROUTINE bcucof
  END INTERFACE
INTERFACE
    SUBROUTINE bcuint(y,y1,y2,y12,x1l,x1u,x2l,x2u,x1,x2,ansy,&
                      ansy1,ansy2)
    USE nrtype
    REAL(SP), DIMENSION(4), INTENT(IN) :: y,y1,y2,y12
    REAL(SP), INTENT(IN) :: x1l,x1u,x2l,x2u,x1,x2
    REAL(SP), INTENT(OUT) :: ansy,ansy1,ansy2
    END SUBROUTINE bcuint
  END INTERFACE
INTERFACE beschb
    SUBROUTINE beschb_s(x,gam1,gam2,gampl,gammi)
    USE nrtype
    REAL(DP), INTENT(IN) :: x
    REAL(DP), INTENT(OUT) :: gam1,gam2,gampl,gammi
    END SUBROUTINE beschb_s

    SUBROUTINE beschb_v(x,gam1,gam2,gampl,gammi)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: x
    REAL(DP), DIMENSION(:), INTENT(OUT) :: gam1,gam2,gampl,gammi
    END SUBROUTINE beschb_v
  END INTERFACE
INTERFACE bessi
    FUNCTION bessi_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessi_s
    END FUNCTION bessi_s

    FUNCTION bessi_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessi_v
    END FUNCTION bessi_v
  END INTERFACE
INTERFACE bessio
    FUNCTION bessi0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessi0_s
    END FUNCTION bessi0_s

    FUNCTION bessi0_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessi0_v
    END FUNCTION bessi0_v
  END INTERFACE
INTERFACE bessi1
    FUNCTION bessi1_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessi1_s
    END FUNCTION bessi1_s
  
```

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```

FUNCTION bessi1_v(x)
USE nrtype
REAL(SP), DIMENSION(:, INTENT(IN) :: x
REAL(SP), DIMENSION(size(x)) :: bessi1_v
END FUNCTION bessi1_v
END INTERFACE
INTERFACE
  SUBROUTINE bessik(x,xnu,ri,rk,rip,rkp)
  USE nrtype
  REAL(SP), INTENT(IN) :: x,xnu
  REAL(SP), INTENT(OUT) :: ri,rk,rip,rkp
  END SUBROUTINE bessik
END INTERFACE
INTERFACE bessj
  FUNCTION bessj_s(n,x)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: n
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: bessj_s
  END FUNCTION bessj_s
  FUNCTION bessj_v(n,x)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: n
  REAL(SP), DIMENSION(:, INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: bessj_v
  END FUNCTION bessj_v
END INTERFACE
INTERFACE bessj0
  FUNCTION bessj0_s(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: bessj0_s
  END FUNCTION bessj0_s
  FUNCTION bessj0_v(x)
  USE nrtype
  REAL(SP), DIMENSION(:, INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: bessj0_v
  END FUNCTION bessj0_v
END INTERFACE
INTERFACE bessj1
  FUNCTION bessj1_s(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: bessj1_s
  END FUNCTION bessj1_s
  FUNCTION bessj1_v(x)
  USE nrtype
  REAL(SP), DIMENSION(:, INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: bessj1_v
  END FUNCTION bessj1_v
END INTERFACE
INTERFACE bessjy
  SUBROUTINE bessjy_s(x,xnu,rj,ry,rjp,ryp)
  USE nrtype
  REAL(SP), INTENT(IN) :: x,xnu
  REAL(SP), INTENT(OUT) :: rj,ry,rjp,ryp
  END SUBROUTINE bessjy_s
  SUBROUTINE bessjy_v(x,xnu,rj,ry,rjp,ryp)
  USE nrtype
  REAL(SP), INTENT(IN) :: xnu
  REAL(SP), DIMENSION(:, INTENT(IN) :: x
  REAL(SP), DIMENSION(:, INTENT(OUT) :: rj,rjp,ry,ryp

```

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```

    END SUBROUTINE bessjy_v
END INTERFACE
INTERFACE bessk
    FUNCTION bessk_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessk_s
    END FUNCTION bessk_s

    FUNCTION bessk_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessk_v
    END FUNCTION bessk_v
END INTERFACE
INTERFACE bessk0
    FUNCTION bessk0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessk0_s
    END FUNCTION bessk0_s

    FUNCTION bessk0_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessk0_v
    END FUNCTION bessk0_v
END INTERFACE
INTERFACE bessk1
    FUNCTION bessk1_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessk1_s
    END FUNCTION bessk1_s

    FUNCTION bessk1_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessk1_v
    END FUNCTION bessk1_v
END INTERFACE
INTERFACE bessy
    FUNCTION bessy_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessy_s
    END FUNCTION bessy_s

    FUNCTION bessy_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessy_v
    END FUNCTION bessy_v
END INTERFACE
INTERFACE bessy0
    FUNCTION bessy0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessy0_s
    END FUNCTION bessy0_s

    FUNCTION bessy0_v(x)
    USE nrtype

```

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```

REAL(SP), DIMENSION(:), INTENT(IN) :: x
REAL(SP), DIMENSION(size(x)) :: bessy0_v
END FUNCTION bessy0_v
END INTERFACE
INTERFACE bessy1
  FUNCTION bessy1_s(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: bessy1_s
  END FUNCTION bessy1_s
  FUNCTION bessy1_v(x)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: bessy1_v
  END FUNCTION bessy1_v
END INTERFACE
INTERFACE beta
  FUNCTION beta_s(z,w)
  USE nrtype
  REAL(SP), INTENT(IN) :: z,w
  REAL(SP) :: beta_s
  END FUNCTION beta_s
  FUNCTION beta_v(z,w)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: z,w
  REAL(SP), DIMENSION(size(z)) :: beta_v
  END FUNCTION beta_v
END INTERFACE
INTERFACE betacf
  FUNCTION betacf_s(a,b,x)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,b,x
  REAL(SP) :: betacf_s
  END FUNCTION betacf_s
  FUNCTION betacf_v(a,b,x)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,x
  REAL(SP), DIMENSION(size(x)) :: betacf_v
  END FUNCTION betacf_v
END INTERFACE
INTERFACE betai
  FUNCTION betai_s(a,b,x)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,b,x
  REAL(SP) :: betai_s
  END FUNCTION betai_s
  FUNCTION betai_v(a,b,x)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,x
  REAL(SP), DIMENSION(size(a)) :: betai_v
  END FUNCTION betai_v
END INTERFACE
INTERFACE bico
  FUNCTION bico_s(n,k)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: n,k
  REAL(SP) :: bico_s
  END FUNCTION bico_s
  FUNCTION bico_v(n,k)
  USE nrtype
  INTEGER(I4B), DIMENSION(:), INTENT(IN) :: n,k
  REAL(SP), DIMENSION(size(n)) :: bico_v

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```

    END FUNCTION bico_v
END INTERFACE
INTERFACE
    FUNCTION bnldev(pp,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: pp
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP) :: bnldev
    END FUNCTION bnldev
END INTERFACE
INTERFACE
    FUNCTION brent(ax,bx,cx,func,tol,xmin)
    USE nrtype
    REAL(SP), INTENT(IN) :: ax,bx,cx,tol
    REAL(SP), INTENT(OUT) :: xmin
    REAL(SP) :: brent
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION brent
END INTERFACE
SUBROUTINE broydn(x,check)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: x
LOGICAL(LGT), INTENT(OUT) :: check
END SUBROUTINE broydn
END INTERFACE
INTERFACE
    SUBROUTINE bsstep(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:, ), INTENT(IN) :: y
        REAL(SP), DIMENSION(:, ), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE bsstep
END INTERFACE
SUBROUTINE caldat(julian,mm,id,iyyy)
USE nrtype
INTEGER(I4B), INTENT(IN) :: julian
INTEGER(I4B), INTENT(OUT) :: mm,id,iyyy
END SUBROUTINE caldat
END INTERFACE
INTERFACE
    FUNCTION chder(a,b,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: c
    REAL(SP), DIMENSION(size(c)) :: chder
    END FUNCTION chder

```

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```

END INTERFACE
INTERFACE chebev
  FUNCTION chebev_s(a,b,c,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b,x
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: c
    REAL(SP) :: chebev_s
  END FUNCTION chebev_s

  FUNCTION chebev_v(a,b,c,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: c,x
    REAL(SP), DIMENSION(size(x)) :: chebev_v
  END FUNCTION chebev_v
END INTERFACE
INTERFACE
  FUNCTION chebft(a,b,n,func)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(n) :: chebft
    INTERFACE
      FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
      END FUNCTION func
    END INTERFACE
    END FUNCTION chebft
END INTERFACE
INTERFACE
  FUNCTION chebpc(c)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: c
    REAL(SP), DIMENSION(size(c)) :: chebpc
  END FUNCTION chebpc
END INTERFACE
INTERFACE
  FUNCTION chint(a,b,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: c
    REAL(SP), DIMENSION(size(c)) :: chint
  END FUNCTION chint
END INTERFACE
INTERFACE
  SUBROUTINE choldc(a,p)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: p
  END SUBROUTINE choldc
END INTERFACE
INTERFACE
  SUBROUTINE cholsl(a,p,b,x)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: a
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: p,b
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: x
  END SUBROUTINE cholsl
END INTERFACE
INTERFACE
  SUBROUTINE chsone(bins,ebins,knstrn,df,chsq,prob)
    USE nrtype

```

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```

INTEGER(I4B), INTENT(IN) :: knstrn
REAL(SP), INTENT(OUT) :: df, chsq, prob
REAL(SP), DIMENSION(:), INTENT(IN) :: bins, ebins
END SUBROUTINE chsone
END INTERFACE
INTERFACE
  SUBROUTINE chstwo(bins1,bins2,knstrn,df, chsq,prob)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: knstrn
  REAL(SP), INTENT(OUT) :: df, chsq, prob
  REAL(SP), DIMENSION(:), INTENT(IN) :: bins1,bins2
  END SUBROUTINE chstwo
END INTERFACE
INTERFACE
  SUBROUTINE cisi(x,ci,si)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP), INTENT(OUT) :: ci, si
  END SUBROUTINE cisi
END INTERFACE
INTERFACE
  SUBROUTINE cntab1(nn,chisq,df,prob,cramrv,ccc)
  USE nrtype
  INTEGER(I4B), DIMENSION(:,:), INTENT(IN) :: nn
  REAL(SP), INTENT(OUT) :: chisq,df,prob,cramrv,ccc
  END SUBROUTINE cntab1
END INTERFACE
INTERFACE
  SUBROUTINE cntab2(nn,h,hx,hy,hygx,hxgy,uygx,uxgy,uxy)
  USE nrtype
  INTEGER(I4B), DIMENSION(:,:), INTENT(IN) :: nn
  REAL(SP), INTENT(OUT) :: h,hx,hy,hygx,hxgy,uygx,uxgy,uxy
  END SUBROUTINE cntab2
END INTERFACE
INTERFACE
  FUNCTION convlv(data,respns,isign)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: data
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: respns
  INTEGER(I4B), INTENT(IN) :: isign
  REAL(SP), DIMENSION(size(data)) :: convlv
  END FUNCTION convlv
END INTERFACE
INTERFACE
  FUNCTION correl(data1,data2)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: data1,data2
  REAL(SP), DIMENSION(size(data1)) :: correl
  END FUNCTION correl
END INTERFACE
INTERFACE
  SUBROUTINE cosft1(y)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: y
  END SUBROUTINE cosft1
END INTERFACE
INTERFACE
  SUBROUTINE cosft2(y,isign)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: y
  INTEGER(I4B), INTENT(IN) :: isign
  END SUBROUTINE cosft2
END INTERFACE

```

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```

SUBROUTINE covsrt(covar,maska)
USE nrtype
REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: covar
LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
END SUBROUTINE covsrt
END INTERFACE
INTERFACE
    SUBROUTINE cyclic(a,b,c,alpha,beta,r,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN):: a,b,c,r
    REAL(SP), INTENT(IN) :: alpha,beta
    REAL(SP), DIMENSION(:), INTENT(OUT):: x
    END SUBROUTINE cyclic
END INTERFACE
INTERFACE
    SUBROUTINE daub4(a,isign)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE daub4
END INTERFACE
INTERFACE dawson
    FUNCTION dawson_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: dawson_s
    END FUNCTION dawson_s
    FUNCTION dawson_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: dawson_v
    END FUNCTION dawson_v
END INTERFACE
INTERFACE
    FUNCTION dbrent(ax,bx,cx,func,dbrent_dfunc,tol,xmin)
    USE nrtype
    REAL(SP), INTENT(IN) :: ax,bx,cx,tol
    REAL(SP), INTENT(OUT) :: xmin
    REAL(SP) :: dbrent
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
        FUNCTION dbrent_dfunc(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: dbrent_dfunc
        END FUNCTION dbrent_dfunc
    END INTERFACE
    END FUNCTION dbrent
END INTERFACE
INTERFACE
    SUBROUTINE ddpoly(c,x,pd)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(IN) :: c
    REAL(SP), DIMENSION(:), INTENT(OUT) :: pd
    END SUBROUTINE ddpoly
END INTERFACE
INTERFACE
    FUNCTION decchk(string,ch)

```

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```

USE nrtype
CHARACTER(1), DIMENSION(:), INTENT(IN) :: string
CHARACTER(1), INTENT(OUT) :: ch
LOGICAL(LGT) :: decchk
END FUNCTION decchk
END INTERFACE
INTERFACE
  SUBROUTINE dfpmin(p,gtol,iter,fret,func,dfunc)
  USE nrtype
  INTEGER(I4B), INTENT(OUT) :: iter
  REAL(SP), INTENT(IN) :: gtol
  REAL(SP), INTENT(OUT) :: fret
  REAL(SP), DIMENSION(:), INTENT(INOUT) :: p
  INTERFACE
    FUNCTION func(p)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: p
    REAL(SP) :: func
    END FUNCTION func

    FUNCTION dfunc(p)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: p
    REAL(SP), DIMENSION(size(p)) :: dfunc
    END FUNCTION dfunc
  END INTERFACE
  END SUBROUTINE dfpmin
END INTERFACE
INTERFACE
  FUNCTION dfridr(func,x,h,err)
  USE nrtype
  REAL(SP), INTENT(IN) :: x,h
  REAL(SP), INTENT(OUT) :: err
  REAL(SP) :: dfridr
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: func
    END FUNCTION func
  END INTERFACE
  END FUNCTION dfridr
END INTERFACE
INTERFACE
  SUBROUTINE dftcor(w,delta,a,b,endpts,corre,corim,corfac)
  USE nrtype
  REAL(SP), INTENT(IN) :: w,delta,a,b
  REAL(SP), INTENT(OUT) :: corre,corim,corfac
  REAL(SP), DIMENSION(:), INTENT(IN) :: endpts
  END SUBROUTINE dftcor
END INTERFACE
INTERFACE
  SUBROUTINE dftint(func,a,b,w,cosint,sinint)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,b,w
  REAL(SP), INTENT(OUT) :: cosint,sinint
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: func
    END FUNCTION func
  END INTERFACE
  END SUBROUTINE dftint
END INTERFACE

```

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```

END INTERFACE
INTERFACE
  SUBROUTINE difeq(k,k1,k2,jsf,is1,isf,indexv,s,y)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: is1,isf,jsf,k,k1,k2
  INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indexv
  REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: s
  REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: y
  END SUBROUTINE difeq
END INTERFACE
INTERFACE
  FUNCTION eclass(lista,listb,n)
  USE nrtype
  INTEGER(I4B), DIMENSION(:, ), INTENT(IN) :: lista,listb
  INTEGER(I4B), INTENT(IN) :: n
  INTEGER(I4B), DIMENSION(n) :: eclass
  END FUNCTION eclass
END INTERFACE
INTERFACE
  FUNCTION eclazz(equiv,n)
  USE nrtype
  INTERFACE
    FUNCTION equiv(i,j)
    USE nrtype
    LOGICAL(LGT) :: equiv
    INTEGER(I4B), INTENT(IN) :: i,j
    END FUNCTION equiv
  END INTERFACE
  INTEGER(I4B), INTENT(IN) :: n
  INTEGER(I4B), DIMENSION(n) :: eclazz
  END FUNCTION eclazz
END INTERFACE
INTERFACE
  FUNCTION ei(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: ei
  END FUNCTION ei
END INTERFACE
INTERFACE
  SUBROUTINE eigsrt(d,v)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: d
  REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: v
  END SUBROUTINE eigsrt
END INTERFACE
INTERFACE elle
  FUNCTION elle_s(phi,ak)
  USE nrtype
  REAL(SP), INTENT(IN) :: phi,ak
  REAL(SP) :: elle_s
  END FUNCTION elle_s
  FUNCTION elle_v(phi,ak)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: phi,ak
  REAL(SP), DIMENSION(size(phi)) :: elle_v
  END FUNCTION elle_v
END INTERFACE
INTERFACE ellf
  FUNCTION ellf_s(phi,ak)
  USE nrtype
  REAL(SP), INTENT(IN) :: phi,ak
  REAL(SP) :: ellf_s

```

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```

END FUNCTION ellf_s
FUNCTION ellf_v(phi,ak)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: phi,ak
REAL(SP), DIMENSION(size(phi)) :: ellf_v
END FUNCTION ellf_v
END INTERFACE
INTERFACE ellpi
  FUNCTION ellpi_s(phi,en,ak)
  USE nrtype
  REAL(SP), INTENT(IN) :: phi,en,ak
  REAL(SP) :: ellpi_s
  END FUNCTION ellpi_s
  FUNCTION ellpi_v(phi,en,ak)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: phi,en,ak
  REAL(SP), DIMENSION(size(phi)) :: ellpi_v
  END FUNCTION ellpi_v
END INTERFACE
INTERFACE
  SUBROUTINE elmhes(a)
  USE nrtype
  REAL(SP), DIMENSION(:, :), INTENT(INOUT) :: a
  END SUBROUTINE elmhes
END INTERFACE
INTERFACE erf
  FUNCTION erf_s(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: erf_s
  END FUNCTION erf_s
  FUNCTION erf_v(x)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: erf_v
  END FUNCTION erf_v
END INTERFACE
INTERFACE erfc
  FUNCTION erfc_s(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: erfc_s
  END FUNCTION erfc_s
  FUNCTION erfc_v(x)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: erfc_v
  END FUNCTION erfc_v
END INTERFACE
INTERFACE erfcc
  FUNCTION erfcc_s(x)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: erfcc_s
  END FUNCTION erfcc_s
  FUNCTION erfcc_v(x)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: erfcc_v
  END FUNCTION erfcc_v
END INTERFACE
INTERFACE

```

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```

SUBROUTINE eulsum(sum,term,jterm)
USE nrtype
REAL(SP), INTENT(INOUT) :: sum
REAL(SP), INTENT(IN) :: term
INTEGER(I4B), INTENT(IN) :: jterm
END SUBROUTINE eulsum
END INTERFACE
INTERFACE
    FUNCTION evlmem(fdt,d,xms)
    USE nrtype
    REAL(SP), INTENT(IN) :: fdt,xms
    REAL(SP), DIMENSION(:), INTENT(IN) :: d
    REAL(SP) :: evlmem
    END FUNCTION evlmem
END INTERFACE
INTERFACE expdev
    SUBROUTINE expdev_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE expdev_s
    SUBROUTINE expdev_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE expdev_v
END INTERFACE
INTERFACE
    FUNCTION expint(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: expint
    END FUNCTION expint
END INTERFACE
INTERFACE factln
    FUNCTION factln_s(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP) :: factln_s
    END FUNCTION factln_s
    FUNCTION factln_v(n)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: n
    REAL(SP), DIMENSION(size(n)) :: factln_v
    END FUNCTION factln_v
END INTERFACE
INTERFACE factrl
    FUNCTION factrl_s(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP) :: factrl_s
    END FUNCTION factrl_s
    FUNCTION factrl_v(n)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: n
    REAL(SP), DIMENSION(size(n)) :: factrl_v
    END FUNCTION factrl_v
END INTERFACE
INTERFACE
    SUBROUTINE fasper(x,y,ofac,hifac,px,py,jmax,prob)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(IN) :: ofac,hifac
    INTEGER(I4B), INTENT(OUT) :: jmax

```

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```

REAL(SP), INTENT(OUT) :: prob
REAL(SP), DIMENSION(:), POINTER :: px,py
END SUBROUTINE fasper
END INTERFACE
INTERFACE
    SUBROUTINE fdjac(x,fvec,df)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: fvec
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: df
    END SUBROUTINE fdjac
END INTERFACE
INTERFACE
    SUBROUTINE fgauss(x,a,y,dyda)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,a
    REAL(SP), DIMENSION(:), INTENT(OUT) :: y
    REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: dyda
    END SUBROUTINE fgauss
END INTERFACE
INTERFACE
    SUBROUTINE fit(x,y,a,b,siga,sigb,chi2,q,sig)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(OUT) :: a,b,siga,sigb,chi2,q
    REAL(SP), DIMENSION(:), OPTIONAL, INTENT(IN) :: sig
    END SUBROUTINE fit
END INTERFACE
INTERFACE
    SUBROUTINE fitexy(x,y,sigx,sigy,a,b,siga,sigb,chi2,q)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sigx,sigy
    REAL(SP), INTENT(OUT) :: a,b,siga,sigb,chi2,q
    END SUBROUTINE fitexy
END INTERFACE
INTERFACE
    SUBROUTINE fixrts(d)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: d
    END SUBROUTINE fixrts
END INTERFACE
INTERFACE
    FUNCTION fleg(x,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(n) :: fleg
    END FUNCTION fleg
END INTERFACE
INTERFACE
    SUBROUTINE flmoon(n,nph,jd,frac)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n,nph
    INTEGER(I4B), INTENT(OUT) :: jd
    REAL(SP), INTENT(OUT) :: frac
    END SUBROUTINE flmoon
END INTERFACE
INTERFACE four1
    SUBROUTINE four1_dp(data,isign)
    USE nrtype
    COMPLEX(DPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_dp

```

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```

SUBROUTINE four1_sp(data,isign)
USE nrtype
COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE four1_sp
END INTERFACE
INTERFACE
    SUBROUTINE four1_alt(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_alt
END INTERFACE
INTERFACE
    SUBROUTINE four1_gather(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_gather
END INTERFACE
INTERFACE
    SUBROUTINE four2(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four2
END INTERFACE
INTERFACE
    SUBROUTINE four2_alt(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four2_alt
END INTERFACE
INTERFACE
    SUBROUTINE four3(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four3
END INTERFACE
INTERFACE
    SUBROUTINE four3_alt(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four3_alt
END INTERFACE
INTERFACE
    SUBROUTINE fourcol(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE fourcol
END INTERFACE
INTERFACE
    SUBROUTINE fourcol_3d(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE fourcol_3d
END INTERFACE
INTERFACE
    SUBROUTINE fourn_gather(data,nn,isign)

```

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```

USE nrtype
COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
INTEGER(I4B), DIMENSION(:), INTENT(IN) :: nn
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE fourn_gather
END INTERFACE
INTERFACE fourrow
SUBROUTINE fourrow_dp(data,isign)
USE nrtype
COMPLEX(DPC), DIMENSION(:,:), INTENT(INOUT) :: data
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE fourrow_dp
SUBROUTINE fourrow_sp(data,isign)
USE nrtype
COMPLEX(SPC), DIMENSION(:,:), INTENT(INOUT) :: data
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE fourrow_sp
END INTERFACE
INTERFACE
SUBROUTINE fourrow_3d(data,isign)
USE nrtype
COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE fourrow_3d
END INTERFACE
INTERFACE
FUNCTION fpoly(x,n)
USE nrtype
REAL(SP), INTENT(IN) :: x
INTEGER(I4B), INTENT(IN) :: n
REAL(SP), DIMENSION(n) :: fpoly
END FUNCTION fpoly
END INTERFACE
INTERFACE
SUBROUTINE fred2(a,b,t,f,w,g,ak)
USE nrtype
REAL(SP), INTENT(IN) :: a,b
REAL(SP), DIMENSION(:, ), INTENT(OUT) :: t,f,w
INTERFACE
FUNCTION g(t)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: t
REAL(SP), DIMENSION(size(t)) :: g
END FUNCTION g
FUNCTION ak(t,s)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: t,s
REAL(SP), DIMENSION(size(t),size(s)) :: ak
END FUNCTION ak
END INTERFACE
END SUBROUTINE fred2
END INTERFACE
INTERFACE
FUNCTION fredin(x,a,b,t,f,w,g,ak)
USE nrtype
REAL(SP), INTENT(IN) :: a,b
REAL(SP), DIMENSION(:, ), INTENT(IN) :: x,t,f,w
REAL(SP), DIMENSION(size(x)) :: fredin
INTERFACE
FUNCTION g(t)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: t
REAL(SP), DIMENSION(size(t)) :: g

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```

END FUNCTION g
FUNCTION ak(t,s)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: t,s
REAL(SP), DIMENSION(size(t),size(s)) :: ak
END FUNCTION ak
END INTERFACE
END FUNCTION fredin
END INTERFACE
INTERFACE
SUBROUTINE frenel(x,s,c)
USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP), INTENT(OUT) :: s,c
END SUBROUTINE frenel
END INTERFACE
INTERFACE
SUBROUTINE frprmn(p,ftol,iter,fret)
USE nrtype
INTEGER(I4B), INTENT(OUT) :: iter
REAL(SP), INTENT(IN) :: ftol
REAL(SP), INTENT(OUT) :: fret
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: p
END SUBROUTINE frprmn
END INTERFACE
INTERFACE
SUBROUTINE ftest(data1,data2,f,prob)
USE nrtype
REAL(SP), INTENT(OUT) :: f,prob
REAL(SP), DIMENSION(:, ), INTENT(IN) :: data1,data2
END SUBROUTINE ftest
END INTERFACE
INTERFACE
FUNCTION gamdev(ia)
USE nrtype
INTEGER(I4B), INTENT(IN) :: ia
REAL(SP) :: gamdev
END FUNCTION gamdev
END INTERFACE
INTERFACE gammLN
FUNCTION gammLN_s(xx)
USE nrtype
REAL(SP), INTENT(IN) :: xx
REAL(SP) :: gammLN_s
END FUNCTION gammLN_s
FUNCTION gammLN_v(xx)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: xx
REAL(SP), DIMENSION(size(xx)) :: gammLN_v
END FUNCTION gammLN_v
END INTERFACE
INTERFACE gammP
FUNCTION gammP_s(a,x)
USE nrtype
REAL(SP), INTENT(IN) :: a,x
REAL(SP) :: gammP_s
END FUNCTION gammP_s
FUNCTION gammP_v(a,x)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,x
REAL(SP), DIMENSION(size(a)) :: gammP_v
END FUNCTION gammP_v
END INTERFACE

```

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```

INTERFACE gammq
  FUNCTION gammq_s(a,x)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,x
  REAL(SP) :: gammq_s
  END FUNCTION gammq_s

  FUNCTION gammq_v(a,x)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,x
  REAL(SP), DIMENSION(size(a)) :: gammq_v
  END FUNCTION gammq_v
END INTERFACE

INTERFACE gasdev
  SUBROUTINE gasdev_s(harvest)
  USE nrtype
  REAL(SP), INTENT(OUT) :: harvest
  END SUBROUTINE gasdev_s

  SUBROUTINE gasdev_v(harvest)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: harvest
  END SUBROUTINE gasdev_v
END INTERFACE

INTERFACE
  SUBROUTINE gaucof(a,b,amu0,x,w)
  USE nrtype
  REAL(SP), INTENT(IN) :: amu0
  REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: a,b
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x,w
  END SUBROUTINE gaucof
END INTERFACE

INTERFACE
  SUBROUTINE gauher(x,w)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x,w
  END SUBROUTINE gauher
END INTERFACE

INTERFACE
  SUBROUTINE gaujac(x,w,alf,bet)
  USE nrtype
  REAL(SP), INTENT(IN) :: alf,bet
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x,w
  END SUBROUTINE gaujac
END INTERFACE

INTERFACE
  SUBROUTINE gaulag(x,w,alf)
  USE nrtype
  REAL(SP), INTENT(IN) :: alf
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x,w
  END SUBROUTINE gaulag
END INTERFACE

INTERFACE
  SUBROUTINE gauleg(x1,x2,x,w)
  USE nrtype
  REAL(SP), INTENT(IN) :: x1,x2
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x,w
  END SUBROUTINE gauleg
END INTERFACE

INTERFACE
  SUBROUTINE gaussj(a,b)
  USE nrtype
  REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a,b
  END SUBROUTINE gaussj
END INTERFACE

```

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```

INTERFACE gcf
  FUNCTION gcf_s(a,x,gln)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,x
  REAL(SP), OPTIONAL, INTENT(OUT) :: gln
  REAL(SP) :: gcf_s
END FUNCTION gcf_s

FUNCTION gcf_v(a,x,gln)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,x
REAL(SP), DIMENSION(:, ), OPTIONAL, INTENT(OUT) :: gln
REAL(SP), DIMENSION(size(a)) :: gcf_v
END FUNCTION gcf_v
END INTERFACE

INTERFACE
  FUNCTION golden(ax,bx,cx,func,tol,xmin)
  USE nrtype
  REAL(SP), INTENT(IN) :: ax,bx,cx,tol
  REAL(SP), INTENT(OUT) :: xmin
  REAL(SP) :: golden
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: func
    END FUNCTION func
  END INTERFACE
  END FUNCTION golden
END INTERFACE

INTERFACE gser
  FUNCTION gser_s(a,x,gln)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,x
  REAL(SP), OPTIONAL, INTENT(OUT) :: gln
  REAL(SP) :: gser_s
END FUNCTION gser_s

FUNCTION gser_v(a,x,gln)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,x
REAL(SP), DIMENSION(:, ), OPTIONAL, INTENT(OUT) :: gln
REAL(SP), DIMENSION(size(a)) :: gser_v
END FUNCTION gser_v
END INTERFACE

INTERFACE
  SUBROUTINE hqr(a,wr,wi)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: wr,wi
  REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a
  END SUBROUTINE hqr
END INTERFACE

INTERFACE
  SUBROUTINE hunt(xx,x,jlo)
  USE nrtype
  INTEGER(I4B), INTENT(INOUT) :: jlo
  REAL(SP), INTENT(IN) :: x
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: xx
  END SUBROUTINE hunt
END INTERFACE

INTERFACE
  SUBROUTINE hypdrv(s,ry,rddyds)
  USE nrtype
  REAL(SP), INTENT(IN) :: s
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: ry
END INTERFACE

```

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```

REAL(SP), DIMENSION(:), INTENT(OUT) :: rdyds
END SUBROUTINE hypdrv
END INTERFACE
INTERFACE
    FUNCTION hypgeo(a,b,c,z)
    USE nrtype
    COMPLEX(SPC), INTENT(IN) :: a,b,c,z
    COMPLEX(SPC) :: hypgeo
    END FUNCTION hypgeo
END INTERFACE
INTERFACE
    SUBROUTINE hypers(a,b,c,z,series,deriv)
    USE nrtype
    COMPLEX(SPC), INTENT(IN) :: a,b,c,z
    COMPLEX(SPC), INTENT(OUT) :: series,deriv
    END SUBROUTINE hypers
END INTERFACE
INTERFACE
    FUNCTION icrc(crc,buf,jinit,jrev)
    USE nrtype
    CHARACTER(1), DIMENSION(:), INTENT(IN) :: buf
    INTEGER(I2B), INTENT(IN) :: crc,jinit
    INTEGER(I4B), INTENT(IN) :: jrev
    INTEGER(I2B) :: icrc
    END FUNCTION icrc
END INTERFACE
INTERFACE
    FUNCTION igray(n,is)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n,is
    INTEGER(I4B) :: igray
    END FUNCTION igray
END INTERFACE
INTERFACE
    RECURSIVE SUBROUTINE index_bypack(arr,index,partial)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    INTEGER(I4B), DIMENSION(:), INTENT(INOUT) :: index
    INTEGER, OPTIONAL, INTENT(IN) :: partial
    END SUBROUTINE index_bypack
END INTERFACE
INTERFACE indexx
    SUBROUTINE indexx_sp(arr,index)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: index
    END SUBROUTINE indexx_sp
    SUBROUTINE indexx_i4b(iarr,index)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: iarr
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: index
    END SUBROUTINE indexx_i4b
END INTERFACE
INTERFACE
    FUNCTION interp(uc)
    USE nrtype
    REAL(DP), DIMENSION(:, :), INTENT(IN) :: uc
    REAL(DP), DIMENSION(2*size(uc,1)-1, 2*size(uc,1)-1) :: interp
    END FUNCTION interp
END INTERFACE
INTERFACE
    FUNCTION rank(indx)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx

```

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```

INTEGER(I4B), DIMENSION(size(indx)) :: rank
END FUNCTION rank
END INTERFACE
INTERFACE
    FUNCTION irbit1(iseed)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: iseed
    INTEGER(I4B) :: irbit1
    END FUNCTION irbit1
END INTERFACE
INTERFACE
    FUNCTION irbit2(iseed)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: iseed
    INTEGER(I4B) :: irbit2
    END FUNCTION irbit2
END INTERFACE
INTERFACE
    SUBROUTINE jacobi(a,d,v,nrot)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: nrot
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: d
    REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: v
    END SUBROUTINE jacobi
END INTERFACE
INTERFACE
    SUBROUTINE jacobn(x,y,dfdx,dfdy)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: y
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: dfdx
    REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: dfdy
    END SUBROUTINE jacobn
END INTERFACE
INTERFACE
    FUNCTION julday(mm,id,iyyy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: mm,id,iyyy
    INTEGER(I4B) :: julday
    END FUNCTION julday
END INTERFACE
INTERFACE
    SUBROUTINE kendl1(data1,data2,tau,z,prob)
    USE nrtype
    REAL(SP), INTENT(OUT) :: tau,z,prob
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: data1,data2
    END SUBROUTINE kendl1
END INTERFACE
INTERFACE
    SUBROUTINE kendl2(tab,tau,z,prob)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: tab
    REAL(SP), INTENT(OUT) :: tau,z,prob
    END SUBROUTINE kendl2
END INTERFACE
INTERFACE
    FUNCTION kermom(y,m)
    USE nrtype
    REAL(DP), INTENT(IN) :: y
    INTEGER(I4B), INTENT(IN) :: m
    REAL(DP), DIMENSION(m) :: kermom
    END FUNCTION kermom
END INTERFACE

```

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```

INTERFACE
  SUBROUTINE ks2d1s(x1,y1,quadvl,d1,prob)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x1,y1
  REAL(SP), INTENT(OUT) :: d1,prob
  INTERFACE
    SUBROUTINE quadvl(x,y,fa,fb,fc,fd)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y
    REAL(SP), INTENT(OUT) :: fa,fb,fc,fd
    END SUBROUTINE quadvl
  END INTERFACE
  END SUBROUTINE ks2d1s
END INTERFACE
INTERFACE
  SUBROUTINE ks2d2s(x1,y1,x2,y2,d,prob)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x1,y1,x2,y2
  REAL(SP), INTENT(OUT) :: d,prob
  END SUBROUTINE ks2d2s
END INTERFACE
INTERFACE
  SUBROUTINE ksone(data,func,d,prob)
  USE nrtype
  REAL(SP), INTENT(OUT) :: d,prob
  REAL(SP), DIMENSION(:), INTENT(INOUT) :: data
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: func
    END FUNCTION func
  END INTERFACE
  END SUBROUTINE ksone
END INTERFACE
INTERFACE
  SUBROUTINE kstwo(data1,data2,d,prob)
  USE nrtype
  REAL(SP), INTENT(OUT) :: d,prob
  REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
  END SUBROUTINE kstwo
END INTERFACE
INTERFACE
  SUBROUTINE laguer(a,x,its)
  USE nrtype
  INTEGER(I4B), INTENT(OUT) :: its
  COMPLEX(SPC), INTENT(INOUT) :: x
  COMPLEX(SPC), DIMENSION(:), INTENT(IN) :: a
  END SUBROUTINE laguer
END INTERFACE
INTERFACE
  SUBROUTINE lfit(x,y,sig,a,maska,covar,chisq,funcs)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sig
  REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
  LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
  REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: covar
  REAL(SP), INTENT(OUT) :: chisq
  INTERFACE
    SUBROUTINE funcs(x,arr)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: arr
    END SUBROUTINE funcs
  
```

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```

END INTERFACE
END SUBROUTINE lfit
END INTERFACE
INTERFACE
  SUBROUTINE linbcg(b,x,itol,tol,itmax,iter,err)
  USE nrtype
  REAL(DP), DIMENSION(:), INTENT(IN) :: b
  REAL(DP), DIMENSION(:), INTENT(INOUT) :: x
  INTEGER(I4B), INTENT(IN) :: itol,itmax
  REAL(DP), INTENT(IN) :: tol
  INTEGER(I4B), INTENT(OUT) :: iter
  REAL(DP), INTENT(OUT) :: err
  END SUBROUTINE linbcg
END INTERFACE
INTERFACE
  SUBROUTINE linmin(p,xi,fret)
  USE nrtype
  REAL(SP), INTENT(OUT) :: fret
  REAL(SP), DIMENSION(:), TARGET, INTENT(INOUT) :: p,xi
  END SUBROUTINE linmin
END INTERFACE
INTERFACE
  SUBROUTINE lnsrch(xold,fold,g,p,x,f,stpmx,check,func)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: xold,g
  REAL(SP), DIMENSION(:), INTENT(INOUT) :: p
  REAL(SP), INTENT(IN) :: fold,stpmx
  REAL(SP), DIMENSION(:), INTENT(OUT) :: x
  REAL(SP), INTENT(OUT) :: f
  LOGICAL(LGT), INTENT(OUT) :: check
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP) :: func
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    END FUNCTION func
  END INTERFACE
  END SUBROUTINE lnsrch
END INTERFACE
INTERFACE
  FUNCTION locate(xx,x)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: xx
  REAL(SP), INTENT(IN) :: x
  INTEGER(I4B) :: locate
  END FUNCTION locate
END INTERFACE
INTERFACE
  FUNCTION lop(u)
  USE nrtype
  REAL(DP), DIMENSION(:, :), INTENT(IN) :: u
  REAL(DP), DIMENSION(size(u,1),size(u,1)) :: lop
  END FUNCTION lop
END INTERFACE
INTERFACE
  SUBROUTINE lubksb(a,indx,b)
  USE nrtype
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: a
  INTEGER(I4B), DIMENSION(:, ), INTENT(IN) :: indx
  REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: b
  END SUBROUTINE lubksb
END INTERFACE
INTERFACE
  SUBROUTINE ludcmp(a,indx,d)

```

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```

USE nrtype
REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: indx
REAL(SP), INTENT(OUT) :: d
END SUBROUTINE ludcmp
END INTERFACE
INTERFACE
  SUBROUTINE machar(ibeta,it,irnd,ngrd,machep,negep,iexp,minexp,&
    maxexp,eps,epsneg,xmin,xmax)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: ibeta,iexp,irnd,it,machep,maxexp,&
      minexp,negep,ngrd
    REAL(SP), INTENT(OUT) :: eps,epsneg,xmax,xmin
  END SUBROUTINE machar
END INTERFACE
INTERFACE
  SUBROUTINE medfit(x,y,a,b,abdev)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(OUT) :: a,b,abdev
  END SUBROUTINE medfit
END INTERFACE
INTERFACE
  SUBROUTINE memcof(data,xms,d)
    USE nrtype
    REAL(SP), INTENT(OUT) :: xms
    REAL(SP), DIMENSION(:), INTENT(IN) :: data
    REAL(SP), DIMENSION(:), INTENT(OUT) :: d
  END SUBROUTINE memcof
END INTERFACE
INTERFACE
  SUBROUTINE mgfas(u,maxcyc)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    INTEGER(I4B), INTENT(IN) :: maxcyc
  END SUBROUTINE mgfas
END INTERFACE
INTERFACE
  SUBROUTINE mglin(u,ncycle)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    INTEGER(I4B), INTENT(IN) :: ncycle
  END SUBROUTINE mglin
END INTERFACE
INTERFACE
  SUBROUTINE midexp(funk,aa,bb,s,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: aa,bb
    REAL(SP), INTENT(INOUT) :: s
    INTEGER(I4B), INTENT(IN) :: n
  INTERFACE
    FUNCTION funk(x)
      USE nrtype
      REAL(SP), DIMENSION(:), INTENT(IN) :: x
      REAL(SP), DIMENSION(size(x)) :: funk
    END FUNCTION funk
  END INTERFACE
  END SUBROUTINE midexp
END INTERFACE
SUBROUTINE midinf(funk,aa,bb,s,n)
  USE nrtype
  REAL(SP), INTENT(IN) :: aa,bb
  REAL(SP), INTENT(INOUT) :: s

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```

INTEGER(I4B), INTENT(IN) :: n
INTERFACE
    FUNCTION funk(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: funk
    END FUNCTION funk
END INTERFACE
END SUBROUTINE midinf
END INTERFACE
SUBROUTINE midpnt(func,a,b,s,n)
USE nrtype
REAL(SP), INTENT(IN) :: a,b
REAL(SP), INTENT(INOUT) :: s
INTEGER(I4B), INTENT(IN) :: n
INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: func
    END FUNCTION func
END INTERFACE
END SUBROUTINE midpnt
END INTERFACE
SUBROUTINE midsql(funk,aa,bb,s,n)
USE nrtype
REAL(SP), INTENT(IN) :: aa,bb
REAL(SP), INTENT(INOUT) :: s
INTEGER(I4B), INTENT(IN) :: n
INTERFACE
    FUNCTION funk(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: funk
    END FUNCTION funk
END INTERFACE
END SUBROUTINE midsql
END INTERFACE
SUBROUTINE midsqu(funk,aa,bb,s,n)
USE nrtype
REAL(SP), INTENT(IN) :: aa,bb
REAL(SP), INTENT(INOUT) :: s
INTEGER(I4B), INTENT(IN) :: n
INTERFACE
    FUNCTION funk(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: funk
    END FUNCTION funk
END INTERFACE
END SUBROUTINE midsqu
END INTERFACE
RECURSIVE SUBROUTINE miser(func,regn,ndim,npts,dith,ave,var)
USE nrtype
INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP) :: func
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    END FUNCTION func

```

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```

END INTERFACE
REAL(SP), DIMENSION(:), INTENT(IN) :: regn
INTEGER(I4B), INTENT(IN) :: ndim,npts
REAL(SP), INTENT(IN) :: dith
REAL(SP), INTENT(OUT) :: ave,var
END SUBROUTINE miser
END INTERFACE
INTERFACE
SUBROUTINE mmid(y,dydx,xs,htot,nstep,yout,derivs)
USE nrtype
INTEGER(I4B), INTENT(IN) :: nstep
REAL(SP), INTENT(IN) :: xs,htot
REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx
REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
INTERFACE
SUBROUTINE derivs(x,y,dydx)
USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP), DIMENSION(:), INTENT(IN) :: y
REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
END SUBROUTINE derivs
END INTERFACE
END SUBROUTINE mmid
END INTERFACE
INTERFACE
SUBROUTINE mnbrak(ax,bx,cx,fa,fb,fc,func)
USE nrtype
REAL(SP), INTENT(INOUT) :: ax,bx
REAL(SP), INTENT(OUT) :: cx,fa,fb,fc
INTERFACE
FUNCTION func(x)
USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP) :: func
END FUNCTION func
END INTERFACE
END SUBROUTINE mnbrak
END INTERFACE
INTERFACE
SUBROUTINE mnewt(ntrial,x,tolx,tolf,usrfun)
USE nrtype
INTEGER(I4B), INTENT(IN) :: ntrial
REAL(SP), INTENT(IN) :: tolx,tolf
REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
INTERFACE
SUBROUTINE usrfun(x,fvec,fjac)
USE nrtype
REAL(SP), DIMENSION(:), INTENT(IN) :: x
REAL(SP), DIMENSION(:), INTENT(OUT) :: fvec
REAL(SP), DIMENSION(:,,:), INTENT(OUT) :: fjac
END SUBROUTINE usrfun
END INTERFACE
END SUBROUTINE mnewt
END INTERFACE
INTERFACE
SUBROUTINE moment(data,ave,adev,sdev,var,skew,curt)
USE nrtype
REAL(SP), INTENT(OUT) :: ave,adev,sdev,var,skew,curt
REAL(SP), DIMENSION(:), INTENT(IN) :: data
END SUBROUTINE moment
END INTERFACE
INTERFACE
SUBROUTINE mp2dfr(a,s,n,m)
USE nrtype

```

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```

INTEGER(I4B), INTENT(IN) :: n
INTEGER(I4B), INTENT(OUT) :: m
CHARACTER(1), DIMENSION(:), INTENT(INOUT) :: a
CHARACTER(1), DIMENSION(:), INTENT(OUT) :: s
END SUBROUTINE mp2dfr
END INTERFACE
INTERFACE
  SUBROUTINE mpdiv(q,r,u,v,n,m)
  USE nrtype
  CHARACTER(1), DIMENSION(:), INTENT(OUT) :: q,r
  CHARACTER(1), DIMENSION(:), INTENT(IN) :: u,v
  INTEGER(I4B), INTENT(IN) :: n,m
  END SUBROUTINE mpdiv
END INTERFACE
INTERFACE
  SUBROUTINE mpinv(u,v,n,m)
  USE nrtype
  CHARACTER(1), DIMENSION(:), INTENT(OUT) :: u
  CHARACTER(1), DIMENSION(:), INTENT(IN) :: v
  INTEGER(I4B), INTENT(IN) :: n,m
  END SUBROUTINE mpinv
END INTERFACE
INTERFACE
  SUBROUTINE mpmul(w,u,v,n,m)
  USE nrtype
  CHARACTER(1), DIMENSION(:), INTENT(IN) :: u,v
  CHARACTER(1), DIMENSION(:), INTENT(OUT) :: w
  INTEGER(I4B), INTENT(IN) :: n,m
  END SUBROUTINE mpmul
END INTERFACE
INTERFACE
  SUBROUTINE mppi(n)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: n
  END SUBROUTINE mppi
END INTERFACE
INTERFACE
  SUBROUTINE mprove(a,alud,indx,b,x)
  USE nrtype
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: a,alud
  INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: b
  REAL(SP), DIMENSION(:, :), INTENT(INOUT) :: x
  END SUBROUTINE mprove
END INTERFACE
INTERFACE
  SUBROUTINE mpsqrt(w,u,v,n,m)
  USE nrtype
  CHARACTER(1), DIMENSION(:), INTENT(OUT) :: w,u
  CHARACTER(1), DIMENSION(:), INTENT(IN) :: v
  INTEGER(I4B), INTENT(IN) :: n,m
  END SUBROUTINE mpsqrt
END INTERFACE
INTERFACE
  SUBROUTINE mrqcof(x,y,sig,a,maska,alpha,beta,chisq,funcs)
  USE nrtype
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: x,y,a,sig
  REAL(SP), DIMENSION(:, :), INTENT(OUT) :: beta
  REAL(SP), DIMENSION(:, :), INTENT(OUT) :: alpha
  REAL(SP), INTENT(OUT) :: chisq
  LOGICAL(LGT), DIMENSION(:, :), INTENT(IN) :: maska
  INTERFACE
    SUBROUTINE funcs(x,a,yfit,dyda)
    USE nrtype
  
```

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```

REAL(SP), DIMENSION(:), INTENT(IN) :: x,a
REAL(SP), DIMENSION(:), INTENT(OUT) :: yfit
REAL(SP), DIMENSION(:,,:), INTENT(OUT) :: dyda
END SUBROUTINE funcs
END INTERFACE
END SUBROUTINE mrqcof
END INTERFACE
INTERFACE
SUBROUTINE mrqmin(x,y,sig,a,maska,covar,alpha,chisq,funcs,alamda)
USE nrtype
REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sig
REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
REAL(SP), DIMENSION(:,,:), INTENT(OUT) :: covar,alpha
REAL(SP), INTENT(OUT) :: chisq
REAL(SP), INTENT(INOUT) :: alamda
LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
INTERFACE
SUBROUTINE funcs(x,a,yfit,dyda)
USE nrtype
REAL(SP), DIMENSION(:), INTENT(IN) :: x,a
REAL(SP), DIMENSION(:), INTENT(OUT) :: yfit
REAL(SP), DIMENSION(:,,:), INTENT(OUT) :: dyda
END SUBROUTINE funcs
END INTERFACE
END SUBROUTINE mrqmin
END INTERFACE
INTERFACE
SUBROUTINE newt(x,check)
USE nrtype
REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
LOGICAL(LGT), INTENT(OUT) :: check
END SUBROUTINE newt
END INTERFACE
INTERFACE
SUBROUTINE odeint(ystart,x1,x2,eps,h1,hmin,derivs,rkqs)
USE nrtype
REAL(SP), DIMENSION(:), INTENT(INOUT) :: ystart
REAL(SP), INTENT(IN) :: x1,x2,eps,h1,hmin
INTERFACE
SUBROUTINE derivs(x,y,dydx)
USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP), DIMENSION(:), INTENT(IN) :: y
REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
END SUBROUTINE derivs

SUBROUTINE rkqs(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
USE nrtype
REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
REAL(SP), INTENT(INOUT) :: x
REAL(SP), INTENT(IN) :: htry,eps
REAL(SP), INTENT(OUT) :: hdid,hnext
INTERFACE
SUBROUTINE derivs(x,y,dydx)
USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP), DIMENSION(:), INTENT(IN) :: y
REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
END SUBROUTINE derivs
END INTERFACE
END SUBROUTINE rkqs
END INTERFACE
END SUBROUTINE odeint

```

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```

END INTERFACE
INTERFACE
  SUBROUTINE orthog(anu,alpha,beta,a,b)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: anu,alpha,beta
  REAL(SP), DIMENSION(:), INTENT(OUT) :: a,b
  END SUBROUTINE orthog
END INTERFACE
INTERFACE
  SUBROUTINE pade(cof,resid)
  USE nrtype
  REAL(DP), DIMENSION(:), INTENT(INOUT) :: cof
  REAL(SP), INTENT(OUT) :: resid
  END SUBROUTINE pade
END INTERFACE
INTERFACE
  FUNCTION pccheb(d)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: d
  REAL(SP), DIMENSION(size(d)) :: pccheb
  END FUNCTION pccheb
END INTERFACE
INTERFACE
  SUBROUTINE pcshft(a,b,d)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,b
  REAL(SP), DIMENSION(:), INTENT(INOUT) :: d
  END SUBROUTINE pcshft
END INTERFACE
INTERFACE
  SUBROUTINE pearsn(x,y,r,prob,z)
  USE nrtype
  REAL(SP), INTENT(OUT) :: r,prob,z
  REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
  END SUBROUTINE pearsn
END INTERFACE
INTERFACE
  SUBROUTINE period(x,y,ofac,hifac,px,py,jmax,prob)
  USE nrtype
  INTEGER(I4B), INTENT(OUT) :: jmax
  REAL(SP), INTENT(IN) :: ofac,hifac
  REAL(SP), INTENT(OUT) :: prob
  REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
  REAL(SP), DIMENSION(:), POINTER :: px,py
  END SUBROUTINE period
END INTERFACE
INTERFACE plgndr
  FUNCTION plgndr_s(l,m,x)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: l,m
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: plgndr_s
  END FUNCTION plgndr_s

  FUNCTION plgndr_v(l,m,x)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: l,m
  REAL(SP), DIMENSION(:), INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: plgndr_v
  END FUNCTION plgndr_v
END INTERFACE
INTERFACE
  FUNCTION poidev(xm)
  USE nrtype

```

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```

REAL(SP), INTENT(IN) :: xm
REAL(SP) :: poidev
END FUNCTION poidev
END INTERFACE
INTERFACE
    FUNCTION polcoe(x,y)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x,y
    REAL(SP), DIMENSION(size(x)) :: polcoe
    END FUNCTION polcoe
END INTERFACE
INTERFACE
    FUNCTION polcof(xa,ya)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: xa,ya
    REAL(SP), DIMENSION(size(xa)) :: polcof
    END FUNCTION polcof
END INTERFACE
INTERFACE
    SUBROUTINE poldiv(u,v,q,r)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: u,v
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: q,r
    END SUBROUTINE poldiv
END INTERFACE
INTERFACE
    SUBROUTINE polin2(x1a,x2a,ya,x1,x2,y,dy)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x1a,x2a
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: ya
    REAL(SP), INTENT(IN) :: x1,x2
    REAL(SP), INTENT(OUT) :: y,dy
    END SUBROUTINE polin2
END INTERFACE
INTERFACE
    SUBROUTINE polint(xa,ya,x,y,dy)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: xa,ya
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: y,dy
    END SUBROUTINE polint
END INTERFACE
INTERFACE
    SUBROUTINE powell(p,xi,ftol,iter,fret)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: p
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: xi
    INTEGER(I4B), INTENT(OUT) :: iter
    REAL(SP), INTENT(IN) :: ftol
    REAL(SP), INTENT(OUT) :: fret
    END SUBROUTINE powell
END INTERFACE
INTERFACE
    FUNCTION predic(data,d,nfut)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: data,d
    INTEGER(I4B), INTENT(IN) :: nfut
    REAL(SP), DIMENSION(nfut) :: predic
    END FUNCTION predic
END INTERFACE
FUNCTION probks(alam)
USE nrtype
REAL(SP), INTENT(IN) :: alam

```

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```

REAL(SP) :: probks
END FUNCTION probks
END INTERFACE
INTERFACE psdes
    SUBROUTINE psdes_s(lword,rword)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: lword,rword
    END SUBROUTINE psdes_s
    SUBROUTINE psdes_v(lword,rword)
    USE nrtype
    INTEGER(I4B), DIMENSION(:, ), INTENT(INOUT) :: lword,rword
    END SUBROUTINE psdes_v
END INTERFACE
INTERFACE
    SUBROUTINE pwt(a,isign)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE pwt
END INTERFACE
INTERFACE
    SUBROUTINE pwtset(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    END SUBROUTINE pwtset
END INTERFACE
INTERFACE pythag
    FUNCTION pythag_dp(a,b)
    USE nrtype
    REAL(DP), INTENT(IN) :: a,b
    REAL(DP) :: pythag_dp
    END FUNCTION pythag_dp
    FUNCTION pythag_sp(a,b)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: pythag_sp
    END FUNCTION pythag_sp
END INTERFACE
INTERFACE
    SUBROUTINE pzextr(iest,xest,yest,yz,dy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: iest
    REAL(SP), INTENT(IN) :: xest
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: yest
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: yz,dy
    END SUBROUTINE pzextr
END INTERFACE
INTERFACE
    SUBROUTINE qrdcmp(a,c,d,sing)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: c,d
    LOGICAL(LGT), INTENT(OUT) :: sing
    END SUBROUTINE qrdcmp
END INTERFACE
INTERFACE
    FUNCTION qromb(func,a,b)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: qromb
    INTERFACE
        FUNCTION func(x)
        USE nrtype
    
```

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```

REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
REAL(SP), DIMENSION(size(x)) :: func
END FUNCTION func
END INTERFACE
END FUNCTION qromb
END INTERFACE
INTERFACE
FUNCTION qromo(func,a,b,choose)
USE nrtype
REAL(SP), INTENT(IN) :: a,b
REAL(SP) :: qromo
INTERFACE
FUNCTION func(x)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
REAL(SP), DIMENSION(size(x)) :: func
END FUNCTION func
END INTERFACE
INTERFACE
SUBROUTINE choose(funk,aa,bb,s,n)
USE nrtype
REAL(SP), INTENT(IN) :: aa,bb
REAL(SP), INTENT(INOUT) :: s
INTEGER(I4B), INTENT(IN) :: n
INTERFACE
FUNCTION funk(x)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
REAL(SP), DIMENSION(size(x)) :: funk
END FUNCTION funk
END INTERFACE
END SUBROUTINE choose
END INTERFACE
END FUNCTION qromo
END INTERFACE
INTERFACE
SUBROUTINE qroot(p,b,c,eps)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(IN) :: p
REAL(SP), INTENT(INOUT) :: b,c
REAL(SP), INTENT(IN) :: eps
END SUBROUTINE qroot
END INTERFACE
INTERFACE
SUBROUTINE qrsolv(a,c,d,b)
USE nrtype
REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: a
REAL(SP), DIMENSION(:, ), INTENT(IN) :: c,d
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: b
END SUBROUTINE qrsolv
END INTERFACE
INTERFACE
SUBROUTINE qrupd(r,qt,u,v)
USE nrtype
REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: r,qt
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: u
REAL(SP), DIMENSION(:, ), INTENT(IN) :: v
END SUBROUTINE qrupd
END INTERFACE
INTERFACE
FUNCTION qsimp(func,a,b)
USE nrtype
REAL(SP), INTENT(IN) :: a,b
REAL(SP) :: qsimp

```

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```

INTERFACE
  FUNCTION func(x)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
  REAL(SP), DIMENSION(size(x)) :: func
  END FUNCTION func
END INTERFACE
END FUNCTION qsimp
END INTERFACE
INTERFACE
  FUNCTION qtrap(func,a,b)
  USE nrtype
  REAL(SP), INTENT(IN) :: a,b
  REAL(SP) :: qtrap
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: func
    END FUNCTION func
  END INTERFACE
  END FUNCTION qtrap
END INTERFACE
INTERFACE
  SUBROUTINE quadct(x,y,xx,yy,fa,fb,fc,fd)
  USE nrtype
  REAL(SP), INTENT(IN) :: x,y
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: xx,yy
  REAL(SP), INTENT(OUT) :: fa,fb,fc,fd
  END SUBROUTINE quadct
END INTERFACE
INTERFACE
  SUBROUTINE quadmx(a)
  USE nrtype
  REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: a
  END SUBROUTINE quadmx
END INTERFACE
INTERFACE
  SUBROUTINE quadvl(x,y,fa,fb,fc,fd)
  USE nrtype
  REAL(SP), INTENT(IN) :: x,y
  REAL(SP), INTENT(OUT) :: fa,fb,fc,fd
  END SUBROUTINE quadvl
END INTERFACE
INTERFACE
  FUNCTION ran(idum)
  INTEGER(selected_int_kind(9)), INTENT(INOUT) :: idum
  REAL :: ran
  END FUNCTION ran
END INTERFACE
INTERFACE ran0
  SUBROUTINE ran0_s(harvest)
  USE nrtype
  REAL(SP), INTENT(OUT) :: harvest
  END SUBROUTINE ran0_s
  SUBROUTINE ran0_v(harvest)
  USE nrtype
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: harvest
  END SUBROUTINE ran0_v
END INTERFACE
INTERFACE ran1
  SUBROUTINE ran1_s(harvest)
  USE nrtype

```

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```

REAL(SP), INTENT(OUT) :: harvest
END SUBROUTINE ran1_s

SUBROUTINE ran1_v(harvest)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(OUT) :: harvest
END SUBROUTINE ran1_v

END INTERFACE

INTERFACE ran2
    SUBROUTINE ran2_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE ran2_s

    SUBROUTINE ran2_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: harvest
    END SUBROUTINE ran2_v

END INTERFACE

INTERFACE ran3
    SUBROUTINE ran3_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE ran3_s

    SUBROUTINE ran3_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: harvest
    END SUBROUTINE ran3_v

END INTERFACE

INTERFACE
    SUBROUTINE ratint(xa,ya,x,y,dy)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: xa,ya
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: y,dy
    END SUBROUTINE ratint
END INTERFACE

INTERFACE
    SUBROUTINE ratlsq(func,a,b,mm,kk,cof,dev)
    USE nrtype
    REAL(DP), INTENT(IN) :: a,b
    INTEGER(I4B), INTENT(IN) :: mm,kk
    REAL(DP), DIMENSION(:, ), INTENT(OUT) :: cof
    REAL(DP), INTENT(OUT) :: dev
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(DP), DIMENSION(:, ), INTENT(IN) :: x
        REAL(DP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE ratlsq
END INTERFACE

INTERFACE ratval
    FUNCTION ratval_s(x,cof,mm,kk)
    USE nrtype
    REAL(DP), INTENT(IN) :: x
    INTEGER(I4B), INTENT(IN) :: mm,kk
    REAL(DP), DIMENSION(mm+kk+1), INTENT(IN) :: cof
    REAL(DP) :: ratval_s
    END FUNCTION ratval_s

    FUNCTION ratval_v(x,cof,mm,kk)
    USE nrtype
    REAL(DP), DIMENSION(:, ), INTENT(IN) :: x

```

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```

INTEGER(I4B), INTENT(IN) :: mm,kk
REAL(DP), DIMENSION(mm+kk+1), INTENT(IN) :: cof
REAL(DP), DIMENSION(size(x)) :: ratval_v
END FUNCTION ratval_v
END INTERFACE
INTERFACE rc
    FUNCTION rc_s(x,y)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y
    REAL(SP) :: rc_s
    END FUNCTION rc_s

    FUNCTION rc_v(x,y)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x,y
    REAL(SP), DIMENSION(size(x)) :: rc_v
    END FUNCTION rc_v
END INTERFACE
INTERFACE rd
    FUNCTION rd_s(x,y,z)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y,z
    REAL(SP) :: rd_s
    END FUNCTION rd_s

    FUNCTION rd_v(x,y,z)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: x,y,z
    REAL(SP), DIMENSION(size(x)) :: rd_v
    END FUNCTION rd_v
END INTERFACE
INTERFACE realft
    SUBROUTINE realft_dp(data,isign,zdata)
    USE nrtype
    REAL(DP), DIMENSION(:, ), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    COMPLEX(DPC), DIMENSION(:, ), OPTIONAL, TARGET :: zdata
    END SUBROUTINE realft_dp

    SUBROUTINE realft_sp(data,isign,zdata)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    COMPLEX(SPC), DIMENSION(:, ), OPTIONAL, TARGET :: zdata
    END SUBROUTINE realft_sp
END INTERFACE
INTERFACE
    RECURSIVE FUNCTION recur1(a,b) RESULT(u)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(size(a)) :: u
    END FUNCTION recur1
END INTERFACE
INTERFACE
    FUNCTION recur2(a,b,c)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,b,c
    REAL(SP), DIMENSION(size(a)) :: recur2
    END FUNCTION recur2
END INTERFACE
INTERFACE
    SUBROUTINE relax(u rhs)
    USE nrtype
    REAL(DP), DIMENSION(:, :, ), INTENT(INOUT) :: u
    REAL(DP), DIMENSION(:, :, ), INTENT(IN) :: rhs
    END SUBROUTINE relax

```

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```

END INTERFACE
INTERFACE
  SUBROUTINE relax2(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: rhs
  END SUBROUTINE relax2
END INTERFACE
INTERFACE
  FUNCTION resid(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: u,rhs
    REAL(DP), DIMENSION(size(u,1),size(u,1)) :: resid
  END FUNCTION resid
END INTERFACE
INTERFACE rf
  FUNCTION rf_s(x,y,z)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y,z
    REAL(SP) :: rf_s
  END FUNCTION rf_s

  FUNCTION rf_v(x,y,z)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,z
    REAL(SP), DIMENSION(size(x)) :: rf_v
  END FUNCTION rf_v
END INTERFACE
INTERFACE rj
  FUNCTION rj_s(x,y,z,p)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y,z,p
    REAL(SP) :: rj_s
  END FUNCTION rj_s

  FUNCTION rj_v(x,y,z,p)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,z,p
    REAL(SP), DIMENSION(size(x)) :: rj_v
  END FUNCTION rj_v
END INTERFACE
INTERFACE
  SUBROUTINE rk4(y,dydx,x,h,yout,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx
    REAL(SP), INTENT(IN) :: x,h
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
  INTERFACE
    SUBROUTINE derivs(x,y,dydx)
      USE nrtype
      REAL(SP), INTENT(IN) :: x
      REAL(SP), DIMENSION(:), INTENT(IN) :: y
      REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
    END SUBROUTINE derivs
  END INTERFACE
  END SUBROUTINE rk4
END INTERFACE
INTERFACE
  SUBROUTINE rkck(y,dydx,x,h,yout,yerr,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx
    REAL(SP), INTENT(IN) :: x,h
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout,yerr
  INTERFACE
    SUBROUTINE derivs(x,y,dydx)

```

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```

USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP), DIMENSION(:), INTENT(IN) :: y
REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
END SUBROUTINE derivs
END INTERFACE
END SUBROUTINE rkck
END INTERFACE
INTERFACE
  SUBROUTINE rkdumb(vstart,x1,x2,nstep,derivs)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: vstart
  REAL(SP), INTENT(IN) :: x1,x2
  INTEGER(I4B), INTENT(IN) :: nstep
  INTERFACE
    SUBROUTINE derivs(x,y,dydx)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(IN) :: y
    REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
    END SUBROUTINE derivs
  END INTERFACE
  END SUBROUTINE rkdumb
END INTERFACE
INTERFACE
  SUBROUTINE rkqs(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
  USE nrtype
  REAL(SP), DIMENSION(:,), INTENT(INOUT) :: y
  REAL(SP), DIMENSION(:,), INTENT(IN) :: dydx,yscal
  REAL(SP), INTENT(INOUT) :: x
  REAL(SP), INTENT(IN) :: htry,eps
  REAL(SP), INTENT(OUT) :: hdid,hnext
  INTERFACE
    SUBROUTINE derivs(x,y,dydx)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(IN) :: y
    REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
    END SUBROUTINE derivs
  END INTERFACE
  END SUBROUTINE rkqs
END INTERFACE
INTERFACE
  SUBROUTINE rlft2(data,spec,speq,isign)
  USE nrtype
  REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: data
  COMPLEX(SPC), DIMENSION(:,:,:), INTENT(OUT) :: spec
  COMPLEX(SPC), DIMENSION(:), INTENT(OUT) :: speq
  INTEGER(I4B), INTENT(IN) :: isign
  END SUBROUTINE rlft2
END INTERFACE
INTERFACE
  SUBROUTINE rlft3(data,spec,speq,isign)
  USE nrtype
  REAL(SP), DIMENSION(:,:,:,:), INTENT(INOUT) :: data
  COMPLEX(SPC), DIMENSION(:,:,:,:), INTENT(OUT) :: spec
  COMPLEX(SPC), DIMENSION(:,:,:), INTENT(OUT) :: speq
  INTEGER(I4B), INTENT(IN) :: isign
  END SUBROUTINE rlft3
END INTERFACE
INTERFACE
  SUBROUTINE rotate(r,qt,i,a,b)
  USE nrtype
  REAL(SP), DIMENSION(:,:,:), TARGET, INTENT(INOUT) :: r,qt

```

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```

INTEGER(I4B), INTENT(IN) :: i
REAL(SP), INTENT(IN) :: a,b
END SUBROUTINE rotate
END INTERFACE
INTERFACE
    SUBROUTINE rsolv(a,d,b)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: a
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: d
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: b
    END SUBROUTINE rsolv
END INTERFACE
INTERFACE
    FUNCTION rstrct(uf)
    USE nrtype
    REAL(DP), DIMENSION(:, :, ), INTENT(IN) :: uf
    REAL(DP), DIMENSION((size(uf,1)+1)/2,(size(uf,1)+1)/2) :: rstrct
    END FUNCTION rstrct
END INTERFACE
INTERFACE
    FUNCTION rtbis(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtbis
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION rtbis
END INTERFACE
INTERFACE
    FUNCTION rtflsp(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtflsp
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION rtflsp
END INTERFACE
INTERFACE
    FUNCTION rtnewt(funcd,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtnewt
    INTERFACE
        SUBROUTINE funcd(x,fval,fderiv)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), INTENT(OUT) :: fval,fderiv
        END SUBROUTINE funcd
    END INTERFACE
    END FUNCTION rtnewt
END INTERFACE
INTERFACE
    FUNCTION rtsafe(funcd,x1,x2,xacc)
    USE nrtype

```

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```

REAL(SP), INTENT(IN) :: x1,x2,xacc
REAL(SP) :: rtsafe
INTERFACE
    SUBROUTINE funcd(x,fval,fderiv)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: fval,fderiv
    END SUBROUTINE funcd
END INTERFACE
END FUNCTION rtsafe
END INTERFACE
INTERFACE
    FUNCTION rtsec(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtsec
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION rtsec
END INTERFACE
INTERFACE
    SUBROUTINE rzextr(iest,xest,yest,yz,dy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: iest
    REAL(SP), INTENT(IN) :: xest
    REAL(SP), DIMENSION(:), INTENT(IN) :: yest
    REAL(SP), DIMENSION(:,), INTENT(OUT) :: yz,dy
    END SUBROUTINE rzextr
END INTERFACE
INTERFACE
    FUNCTION savgol(nl,nrr,ld,m)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: nl,nrr,ld,m
    REAL(SP), DIMENSION(nl+nrr+1) :: savgol
    END FUNCTION savgol
END INTERFACE
INTERFACE
    SUBROUTINE scrsho(func)
    USE nrtype
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE scrsho
END INTERFACE
INTERFACE
    FUNCTION select(k,arr)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: k
    REAL(SP), DIMENSION(:,), INTENT(INOUT) :: arr
    REAL(SP) :: select
    END FUNCTION select
END INTERFACE
INTERFACE
    FUNCTION select_bypack(k,arr)
    USE nrtype

```

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```

INTEGER(I4B), INTENT(IN) :: k
REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
REAL(SP) :: select_bypack
END FUNCTION select_bypack
END INTERFACE
INTERFACE
    SUBROUTINE select_heap(arr,heap)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    REAL(SP), DIMENSION(:), INTENT(OUT) :: heap
    END SUBROUTINE select_heap
END INTERFACE
INTERFACE
    FUNCTION select_inplace(k,arr)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: k
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    REAL(SP) :: select_inplace
    END FUNCTION select_inplace
END INTERFACE
INTERFACE
    SUBROUTINE simplx(a,m1,m2,m3,icase,izrov,iposv)
    USE nrtype
    REAL(SP), DIMENSION(:, :, :), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: m1,m2,m3
    INTEGER(I4B), INTENT(OUT) :: icase
    INTEGER(I4B), DIMENSION(:, :), INTENT(OUT) :: izrov,iposv
    END SUBROUTINE simplx
END INTERFACE
INTERFACE
    SUBROUTINE simpr(y,dydx,dfdx,dfdy,xs,htot,nstep,yout,derivs)
    USE nrtype
    REAL(SP), INTENT(IN) :: xs,htot
    REAL(SP), DIMENSION(:, :), INTENT(IN) :: y,dydx,dfdx
    REAL(SP), DIMENSION(:, :, :), INTENT(IN) :: dfdy
    INTEGER(I4B), INTENT(IN) :: nstep
    REAL(SP), DIMENSION(:, :), INTENT(OUT) :: yout
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:, :), INTENT(IN) :: y
        REAL(SP), DIMENSION(:, :), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE simpr
END INTERFACE
INTERFACE
    SUBROUTINE sinft(y)
    USE nrtype
    REAL(SP), DIMENSION(:, :), INTENT(INOUT) :: y
    END SUBROUTINE sinft
END INTERFACE
INTERFACE
    SUBROUTINE slvsm2(u rhs)
    USE nrtype
    REAL(DP), DIMENSION(3,3), INTENT(OUT) :: u
    REAL(DP), DIMENSION(3,3), INTENT(IN) :: rhs
    END SUBROUTINE slvsm2
END INTERFACE
INTERFACE
    SUBROUTINE slvsm1(u rhs)
    USE nrtype
    REAL(DP), DIMENSION(3,3), INTENT(OUT) :: u
    
```

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```

REAL(DP), DIMENSION(3,3), INTENT(IN) :: rhs
END SUBROUTINE slvsm1
END INTERFACE
INTERFACE
    SUBROUTINE sncndn(uu,emmc,sn,cn,dn)
    USE nrtype
    REAL(SP), INTENT(IN) :: uu,emmc
    REAL(SP), INTENT(OUT) :: sn,cn,dn
    END SUBROUTINE sncndn
END INTERFACE
INTERFACE
    FUNCTION snrm(sx,itol)
    USE nrtype
    REAL(DP), DIMENSION(:, ), INTENT(IN) :: sx
    INTEGER(I4B), INTENT(IN) :: itol
    REAL(DP) :: snrm
    END FUNCTION snrm
END INTERFACE
INTERFACE
    SUBROUTINE sobseq(x,init)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x
    INTEGER(I4B), OPTIONAL, INTENT(IN) :: init
    END SUBROUTINE sobseq
END INTERFACE
INTERFACE
    SUBROUTINE solvde(itmax,conv,slowc,scalv,indexv,nb,y)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: itmax,nb
    REAL(SP), INTENT(IN) :: conv,slowc
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: scalv
    INTEGER(I4B), DIMENSION(:, ), INTENT(IN) :: indexv
    REAL(SP), DIMENSION(:, :), INTENT(INOUT) :: y
    END SUBROUTINE solvde
END INTERFACE
INTERFACE
    SUBROUTINE sor(a,b,c,d,e,f,u,rjac)
    USE nrtype
    REAL(DP), DIMENSION(:, :, ), INTENT(IN) :: a,b,c,d,e,f
    REAL(DP), DIMENSION(:, :, ), INTENT(INOUT) :: u
    REAL(DP), INTENT(IN) :: rjac
    END SUBROUTINE sor
END INTERFACE
INTERFACE
    SUBROUTINE sort(arr)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: arr
    END SUBROUTINE sort
END INTERFACE
INTERFACE
    SUBROUTINE sort2(arr,slave)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: arr,slave
    END SUBROUTINE sort2
END INTERFACE
INTERFACE
    SUBROUTINE sort3(arr,slave1,slave2)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: arr,slave1,slave2
    END SUBROUTINE sort3
END INTERFACE
INTERFACE
    SUBROUTINE sort_bypack(arr)
    USE nrtype

```

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```

REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
END SUBROUTINE sort_bypack
END INTERFACE
INTERFACE
    SUBROUTINE sort_byreshape(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_byreshape
END INTERFACE
INTERFACE
    SUBROUTINE sort_heap(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_heap
END INTERFACE
INTERFACE
    SUBROUTINE sort_pick(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_pick
END INTERFACE
INTERFACE
    SUBROUTINE sort_radix(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_radix
END INTERFACE
INTERFACE
    SUBROUTINE sort_shell(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_shell
END INTERFACE
INTERFACE
    SUBROUTINE spctrm(p,k,ovrlap,unit,n_window)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: p
    INTEGER(I4B), INTENT(IN) :: k
    LOGICAL(LGT), INTENT(IN) :: ovrlap
    INTEGER(I4B), OPTIONAL, INTENT(IN) :: n_window,unit
    END SUBROUTINE spctrm
END INTERFACE
INTERFACE
    SUBROUTINE spear(data1,data2,d,zd,probds,probrs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    REAL(SP), INTENT(OUT) :: d,zd,probds,probrs
    END SUBROUTINE spear
END INTERFACE
INTERFACE sphbes
    SUBROUTINE sphbes_s(n,x,sj,sy,sjp,syp)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: sj, sy, sjp, syp
    END SUBROUTINE sphbes_s
    SUBROUTINE sphbes_v(n,x,sj,sy,sjp,syp)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(OUT) :: sj, sy, sjp, syp
    END SUBROUTINE sphbes_v
END INTERFACE

```

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```

INTERFACE
  SUBROUTINE splie2(x1a,x2a,ya,y2a)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x1a,x2a
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: ya
  REAL(SP), DIMENSION(:, :), INTENT(OUT) :: y2a
  END SUBROUTINE splie2
END INTERFACE
INTERFACE
  FUNCTION splin2(x1a,x2a,ya,y2a,x1,x2)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x1a,x2a
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: ya,y2a
  REAL(SP), INTENT(IN) :: x1,x2
  REAL(SP) :: splin2
  END FUNCTION splin2
END INTERFACE
INTERFACE
  SUBROUTINE spline(x,y,yp1,ypn,y2)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
  REAL(SP), INTENT(IN) :: yp1,ypn
  REAL(SP), DIMENSION(:), INTENT(OUT) :: y2
  END SUBROUTINE spline
END INTERFACE
INTERFACE
  FUNCTION splint(xa,ya,y2a,x)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: xa,ya,y2a
  REAL(SP), INTENT(IN) :: x
  REAL(SP) :: splint
  END FUNCTION splint
END INTERFACE
INTERFACE sprsax
  SUBROUTINE sprsax_dp(sa,x,b)
  USE nrtype
  TYPE(sprs2_dp), INTENT(IN) :: sa
  REAL(DP), DIMENSION (:), INTENT(IN) :: x
  REAL(DP), DIMENSION (:), INTENT(OUT) :: b
  END SUBROUTINE sprsax_dp

  SUBROUTINE sprsax_sp(sa,x,b)
  USE nrtype
  TYPE(sprs2_sp), INTENT(IN) :: sa
  REAL(SP), DIMENSION (:), INTENT(IN) :: x
  REAL(SP), DIMENSION (:), INTENT(OUT) :: b
  END SUBROUTINE sprsax_sp
END INTERFACE
INTERFACE sprsdiag
  SUBROUTINE sprsdiag_dp(sa,b)
  USE nrtype
  TYPE(sprs2_dp), INTENT(IN) :: sa
  REAL(DP), DIMENSION(:), INTENT(OUT) :: b
  END SUBROUTINE sprsdiag_dp

  SUBROUTINE sprsdiag_sp(sa,b)
  USE nrtype
  TYPE(sprs2_sp), INTENT(IN) :: sa
  REAL(SP), DIMENSION(:), INTENT(OUT) :: b
  END SUBROUTINE sprsdiag_sp
END INTERFACE
INTERFACE sprsin
  SUBROUTINE sprsin_sp(a,thresh,sa)
  USE nrtype
  REAL(SP), DIMENSION(:, :), INTENT(IN) :: a

```

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```

REAL(SP), INTENT(IN) :: thresh
TYPE(spars2_sp), INTENT(OUT) :: sa
END SUBROUTINE sprsin_sp

SUBROUTINE sprsin_dp(a,thresh,sa)
USE nrtype
REAL(DP), DIMENSION(:,:), INTENT(IN) :: a
REAL(DP), INTENT(IN) :: thresh
TYPE(spars2_dp), INTENT(OUT) :: sa
END SUBROUTINE sprsin_dp
END INTERFACE

INTERFACE
    SUBROUTINE sprstp(sa)
    USE nrtype
    TYPE(spars2_sp), INTENT(INOUT) :: sa
    END SUBROUTINE sprstp
END INTERFACE

INTERFACE sprstx
    SUBROUTINE sprstx_dp(sa,x,b)
    USE nrtype
    TYPE(spars2_dp), INTENT(IN) :: sa
    REAL(DP), DIMENSION (:), INTENT(IN) :: x
    REAL(DP), DIMENSION (:), INTENT(OUT) :: b
    END SUBROUTINE sprstx_dp

    SUBROUTINE sprstx_sp(sa,x,b)
    USE nrtype
    TYPE(spars2_sp), INTENT(IN) :: sa
    REAL(SP), DIMENSION (:), INTENT(IN) :: x
    REAL(SP), DIMENSION (:), INTENT(OUT) :: b
    END SUBROUTINE sprstx_sp
END INTERFACE

INTERFACE
    SUBROUTINE stiffbs(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE stiffbs
END INTERFACE

INTERFACE
    SUBROUTINE stiff(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE

```

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```

END INTERFACE
END SUBROUTINE stiff
END INTERFACE
INTERFACE
  SUBROUTINE stoerm(y,d2y,xs,htot,nstep,yout,derivs)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: y,d2y
  REAL(SP), INTENT(IN) :: xs,htot
  INTEGER(I4B), INTENT(IN) :: nstep
  REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
INTERFACE
  SUBROUTINE derivs(x,y,dydx)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  REAL(SP), DIMENSION(:), INTENT(IN) :: y
  REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
  END SUBROUTINE derivs
END INTERFACE
END SUBROUTINE stoerm
END INTERFACE
INTERFACE svbksb
  SUBROUTINE svbksb_dp(u,w,v,b,x)
  USE nrtype
  REAL(DP), DIMENSION(:, :, ), INTENT(IN) :: u,v
  REAL(DP), DIMENSION(:, ), INTENT(IN) :: w,b
  REAL(DP), DIMENSION(:, ), INTENT(OUT) :: x
  END SUBROUTINE svbksb_dp

  SUBROUTINE svbksb_sp(u,w,v,b,x)
  USE nrtype
  REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: u,v
  REAL(SP), DIMENSION(:, ), INTENT(IN) :: w,b
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: x
  END SUBROUTINE svbksb_sp
END INTERFACE
INTERFACE svdcmp
  SUBROUTINE svdcmp_dp(a,w,v)
  USE nrtype
  REAL(DP), DIMENSION(:, :, ), INTENT(INOUT) :: a
  REAL(DP), DIMENSION(:, ), INTENT(OUT) :: w
  REAL(DP), DIMENSION(:, :, ), INTENT(OUT) :: v
  END SUBROUTINE svdcmp_dp

  SUBROUTINE svdcmp_sp(a,w,v)
  USE nrtype
  REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: w
  REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: v
  END SUBROUTINE svdcmp_sp
END INTERFACE
INTERFACE
  SUBROUTINE svdfit(x,y,sig,a,v,w,chisq,funcs)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sig
  REAL(SP), DIMENSION(:, ), INTENT(OUT) :: a,w
  REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: v
  REAL(SP), INTENT(OUT) :: chisq
INTERFACE
  FUNCTION funcs(x,n)
  USE nrtype
  REAL(SP), INTENT(IN) :: x
  INTEGER(I4B), INTENT(IN) :: n
  REAL(SP), DIMENSION(n) :: funcs
  END FUNCTION funcs
END INTERFACE
END INTERFACE

```

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```

    END SUBROUTINE svdfit
END INTERFACE
INTERFACE
    SUBROUTINE svdvar(v,w,cvm)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(IN) :: v
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: w
    REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: cvm
    END SUBROUTINE svdvar
END INTERFACE
INTERFACE
    FUNCTION toeplz(r,y)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: r,y
    REAL(SP), DIMENSION(size(y)) :: toeplz
    END FUNCTION toeplz
END INTERFACE
INTERFACE
    SUBROUTINE tptest(data1,data2,t,prob)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: data1,data2
    REAL(SP), INTENT(OUT) :: t,prob
    END SUBROUTINE tptest
END INTERFACE
INTERFACE
    SUBROUTINE tqli(d,e,z)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: d,e
    REAL(SP), DIMENSION(:, :, ), OPTIONAL, INTENT(INOUT) :: z
    END SUBROUTINE tqli
END INTERFACE
INTERFACE
    SUBROUTINE trapzd(func,a,b,s,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), INTENT(INOUT) :: s
    INTEGER(I4B), INTENT(IN) :: n
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:, ), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE trapzd
END INTERFACE
INTERFACE
    SUBROUTINE tred2(a,d,e,novectors)
    USE nrtype
    REAL(SP), DIMENSION(:, :, ), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: d,e
    LOGICAL(LGT), OPTIONAL, INTENT(IN) :: novectors
    END SUBROUTINE tred2
END INTERFACE
! On a purely serial machine, for greater efficiency, remove
! the generic name tridag from the following interface,
! and put it on the next one after that.
INTERFACE tridag
    RECURSIVE SUBROUTINE tridag_par(a,b,c,r,u)
    USE nrtype
    REAL(SP), DIMENSION(:, ), INTENT(IN) :: a,b,c,r
    REAL(SP), DIMENSION(:, ), INTENT(OUT) :: u
    END SUBROUTINE tridag_par
END INTERFACE

```

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```

INTERFACE
  SUBROUTINE tridag_ser(a,b,c,r,u)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,c,r
  REAL(SP), DIMENSION(:), INTENT(OUT) :: u
  END SUBROUTINE tridag_ser
END INTERFACE
INTERFACE
  SUBROUTINE ttest(data1,data2,t,prob)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
  REAL(SP), INTENT(OUT) :: t,prob
  END SUBROUTINE ttest
END INTERFACE
INTERFACE
  SUBROUTINE tutest(data1,data2,t,prob)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
  REAL(SP), INTENT(OUT) :: t,prob
  END SUBROUTINE tutest
END INTERFACE
INTERFACE
  SUBROUTINE twofft(data1,data2,fft1,fft2)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
  COMPLEX(SPC), DIMENSION(:), INTENT(OUT) :: fft1,fft2
  END SUBROUTINE twofft
END INTERFACE
INTERFACE
  FUNCTION vander(x,q)
  USE nrtype
  REAL(DP), DIMENSION(:), INTENT(IN) :: x,q
  REAL(DP), DIMENSION(size(x)) :: vander
  END FUNCTION vander
END INTERFACE
INTERFACE
  SUBROUTINE vegas(region,func,init,ncall,itmx,nprn,tgral,sd,chi2a)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: region
  INTEGER(I4B), INTENT(IN) :: init,ncall,itmx,nprn
  REAL(SP), INTENT(OUT) :: tgral,sd,chi2a
  INTERFACE
    FUNCTION func(pt,wgt)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: pt
    REAL(SP), INTENT(IN) :: wgt
    REAL(SP) :: func
    END FUNCTION func
  END INTERFACE
  END SUBROUTINE vegas
END INTERFACE
INTERFACE
  SUBROUTINE voltra(t0,h,t,f,g,ak)
  USE nrtype
  REAL(SP), INTENT(IN) :: t0,h
  REAL(SP), DIMENSION(:), INTENT(OUT) :: t
  REAL(SP), DIMENSION(:, :, ), INTENT(OUT) :: f
  INTERFACE
    FUNCTION g(t)
    USE nrtype
    REAL(SP), INTENT(IN) :: t
    REAL(SP), DIMENSION(:, ), POINTER :: g
    END FUNCTION g
  END INTERFACE

```

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```

FUNCTION ak(t,s)
USE nrtype
REAL(SP), INTENT(IN) :: t,s
REAL(SP), DIMENSION(:, :, ), POINTER :: ak
END FUNCTION ak
END INTERFACE
END SUBROUTINE voltra
END INTERFACE
INTERFACE
SUBROUTINE wt1(a,isign,wtstep)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: a
INTEGER(I4B), INTENT(IN) :: isign
INTERFACE
SUBROUTINE wtstep(a,isign)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: a
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE wtstep
END INTERFACE
END SUBROUTINE wt1
END INTERFACE
INTERFACE
SUBROUTINE wtn(a,nn,isign,wtstep)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: a
INTEGER(I4B), DIMENSION(:, ), INTENT(IN) :: nn
INTEGER(I4B), INTENT(IN) :: isign
INTERFACE
SUBROUTINE wtstep(a,isign)
USE nrtype
REAL(SP), DIMENSION(:, ), INTENT(INOUT) :: a
INTEGER(I4B), INTENT(IN) :: isign
END SUBROUTINE wtstep
END INTERFACE
END SUBROUTINE wtn
END INTERFACE
INTERFACE
FUNCTION wghts(n,h,kermom)
USE nrtype
INTEGER(I4B), INTENT(IN) :: n
REAL(SP), INTENT(IN) :: h
REAL(SP), DIMENSION(n) :: wghts
INTERFACE
FUNCTION kermom(y,m)
USE nrtype
REAL(DP), INTENT(IN) :: y
INTEGER(I4B), INTENT(IN) :: m
REAL(DP), DIMENSION(m) :: kermom
END FUNCTION kermom
END INTERFACE
END FUNCTION wghts
END INTERFACE
SUBROUTINE zbrac(func,x1,x2,succes)
USE nrtype
REAL(SP), INTENT(INOUT) :: x1,x2
LOGICAL(LGT), INTENT(OUT) :: succes
INTERFACE
FUNCTION func(x)
USE nrtype
REAL(SP), INTENT(IN) :: x
REAL(SP) :: func
END FUNCTION func

```

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```

END INTERFACE
END SUBROUTINE zbrac
END INTERFACE
INTERFACE
  SUBROUTINE zbrak(func,x1,x2,n,xb1,xb2,nb)
  USE nrtype
  INTEGER(I4B), INTENT(IN) :: n
  INTEGER(I4B), INTENT(OUT) :: nb
  REAL(SP), INTENT(IN) :: x1,x2
  REAL(SP), DIMENSION(:), POINTER :: xb1,xb2
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: func
    END FUNCTION func
  END INTERFACE
  END SUBROUTINE zbrak
END INTERFACE
INTERFACE
  FUNCTION zbrent(func,x1,x2,tol)
  USE nrtype
  REAL(SP), INTENT(IN) :: x1,x2,tol
  REAL(SP) :: zbrent
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: func
    END FUNCTION func
  END INTERFACE
  END FUNCTION zbrent
END INTERFACE
INTERFACE
  SUBROUTINE zrhqr(a,rtr,rti)
  USE nrtype
  REAL(SP), DIMENSION(:), INTENT(IN) :: a
  REAL(SP), DIMENSION(:), INTENT(OUT) :: rtr,rti
  END SUBROUTINE zrhqr
END INTERFACE
INTERFACE
  FUNCTION zriddr(func,x1,x2,xacc)
  USE nrtype
  REAL(SP), INTENT(IN) :: x1,x2,xacc
  REAL(SP) :: zriddr
  INTERFACE
    FUNCTION func(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: func
    END FUNCTION func
  END INTERFACE
  END FUNCTION zriddr
END INTERFACE
INTERFACE
  SUBROUTINE zroots(a,roots,polish)
  USE nrtype
  COMPLEX(SPC), DIMENSION(:), INTENT(IN) :: a
  COMPLEX(SPC), DIMENSION(:), INTENT(OUT) :: roots
  LOGICAL(LGT), INTENT(IN) :: polish
  END SUBROUTINE zroots
END INTERFACE
END MODULE nr

```

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